

Evaluation of Educational Material for Tobacco Prevention and Cessation Used in West Virginia University Dental Programs

R. Constance Wiener, DMD; Regina M. Wiener Pla, MA

Introduction

In 2007, 19.3% of the United State's adult population smoked tobacco cigarettes.¹ The smoking rates in the Appalachian region were much higher – the West Virginia smoking prevalence rate was 26.8%, Kentucky's was 28.1% and Tennessee's was 24.2%.¹ From 2000 to 2004, the United States median smoking-attributable mortality rate (SAM) was 288.1 per 100,000.² The West Virginia SAM was 344.3, Kentucky's was 383.9 and Tennessee's was 337.4.² SAM is used as an estimate of the United State's public health burden from smoking. SAM is calculated by multiplying the number of deaths of adults over age 35 from any of the 19 diseases caused by cigarette smoking by an American Cancer Society-derived relative risk estimate of preventable deaths for each disease.⁴

The Appalachian region has an extensive rural population. People who reside in rural areas have been recognized as being more vulnerable through barriers imposed by geographic, economic, educational and socio-cultural factors.^{3,4} Appalachian health behaviors are problematic, and tobacco use is a prime example. As an illustration, nearly half of the pregnant Appalachian women smoked during pregnancy – a rate 3 times higher than the national rate.⁵

Many Appalachian farmers grow tobacco, making it a common commodity. Tobacco companies target the rural Appalachian area.⁶ Overall,

Abstract

Purpose: Patient educational materials for tobacco prevention and cessation are crucial for dental and dental hygiene education. The programs rely upon written educational material for tobacco prevention and cessation, referred to as empty packs (EMT-PCs), which students distribute to the community during face to face or community-based oral health and tobacco awareness programs. The public often does not understand the EMT-PC that is received due to the high level of complexity and readability of the documents. The authors conducted a study to investigate the EMT-PCs available and used in the West Virginia University School of Dentistry programs. It was hypothesized that they were readable at the eighth grade or lower level, used appropriate font, had good production quality, had appropriate content and were current.

Methods: The authors selected 40 EMT-PCs used in tobacco prevention and cessation programs. Initially, the Fry Readability Formula was applied. Next, they evaluated the font, language, production quality, appropriateness for the target audience and recency of the document based upon its copyright or revision within the previous 5 years.

Results: The average reading level of the EMT-PCs was grade 6.67 (range 2–17+). The average font size was 13.8 (range 8–14) and the average date of production or revision was 2003. Patient educational materials for the general public should be produced at or below the eighth grade reading level, have a 12 point or larger font size and be produced or updated within the previous 5 years.

Conclusion: The hypothesis was supported in that EMT-PCs distributed in the West Virginia University School of Dentistry programs met the criteria for appropriate grade level, font, quality and content, while the average copyright or revision date was 5.9 years, slightly beyond the recommended 5 years. Effective EMT-PCs should be readable and appropriately directed to the target audiences. Dental professionals have access to current, quality tobacco cessation documents and should be aware of the need to evaluate the documents for appropriate literacy levels for various groups.

Key words: tobacco cessation education, readability, patient educational materials

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the tobacco industry markets its products with methodically researched strategies, budgeting \$11.22 billion to promote cigarettes in 2001.⁶ The responding tobacco prevention and cessation efforts need to determine useful, successful strategies to be effective in dissuading tobacco use in the face of such heavily funded promotion campaigns. At the West Virginia University School of Dentistry, tobacco prevention and cessation is important in the curriculum for the dental hygiene and dental programs and follows the U.S. Public Health Guidelines.⁷ The guideline model for treatment of tobacco use and dependence is the implementation of the 5A's:⁷

- Ask or screen about smoking
- Advise to quit
- Assess willingness to quit
- Assist with quitting
- Arrange for follow-up

When a patient responds that they are not ready to quit, the corresponding intervention is to ask permission to provide information. If receptive, verbal motivational interviewing follows and EMT-PCs are given.

Thirteen percent of the United States population reads at less than the fourth grade level, with 55% lacking reading skills to function normally as an adult. Of the adult population, 20% have difficulty reading.⁸ In 2003, the adult illiteracy rate in West Virginia was 13%.⁹ Studies have shown that West Virginia has both a high tobacco use rate and an average illiteracy rate.^{1,10}

Since tobacco use leads to more deaths than any other controllable risk factor, the EMT-PCs distributed by dental professionals should meet criteria for readability in tobacco control programs.¹⁰ Many lay people do not understand the EMT-PCs they receive due to the high level of complexity and readability. In most circumstances, an EMT-PC, to be effective, should be readable at the national mean literacy level of the eighth grade, as recommended by the Department of Education.^{8,10} EMT-PCs should also have a high production quality, be pre-tested and be appropriate for the given target audience.¹⁰

Reading level determination may be accomplished with any of several formulas. The Simple Measure of Gobbledygook formula (SMOG) counts words with more than 3 syllables in sample sentences, takes the square root of the count and adds 3 for the grade level.¹¹ The RAIN formula (Readability Assessment Instrument) uses a manual with 14 variables to determine readability.¹¹ The Fry formula was developed by Edward Fry in 1963 and ex-

tended in 1977. Three passages of 100 words are selected at random. The average number of sentences and syllables in 3 passages is determined and plotted onto the Fry graph and the grade level is read from the graph.¹²

This study's research hypotheses were that EMT-PCs, which were available at no charge and used in West Virginia School of Dentistry Programs (Community Dentistry program, the West Virginia University Dental Community Service Program and the West Virginia University Rural Dentistry Program) for the general public, were:

- Readable at the mean literacy level of eighth grade or below
- Had an appropriate format for ease of reading
- Had good production quality
- Had an appropriate font for the target group
- Were current

Methods and Materials

EMT-PCs used by the West Virginia University Community Dentistry program, the West Virginia University Dental Community Service Program and the West Virginia University Rural Dentistry Program were sought for inclusion in the study. Forty EMT-PCs were provided and all were included in this study. Each document was reviewed in its entirety. The formats of the documents were identified as tri-fold, quad-fold, card, booklet or fact sheet.

Reading Level

The authors independently and manually evaluated the documents using the Fry Readability Formula for the reading level of the EMT-PCs. Applying the Fry Readability formula involved 3 randomly selected 100 word samples from the EMT-PCs, counting each sample's sentences and its syllables to the nearest tenth, then calculating the average sentence and syllable length of the 3 samples.¹² The grade level of the EMT-PCs was read directly from the Fry graph from the plot of the average sentence and syllable lengths.¹² During calibration, the inter-rater agreement on the readability was 100%. Professional or clinical terms were collected from the EMT-PCs based on syllable length (over 3 syllables), as well as words requiring definitions within the text and words appearing in the list of Professional Jargon and Difficult Terminology found in Published Patient Education Materials or Professional Jargon.^{8,13} The terms were not specifically used in the analysis, but are presented as examples of words that may pose problems for some readers who would be unfamiliar with health-related terminology.

Font Style

The criteria for font evaluation included using a serif typeface – a font with a small line or bar at the top and bottom of each letter. Serif is the typeface most often used when children in the United States learn to read, and it is the most congenial and comfortable, whereas sans-serif is more common in Europe.¹⁴ Examples of serif fonts include Times Roman, Primer and Century. Font size suitability was a font of 12 or larger, based upon previous studies.¹⁴⁻¹⁶ A 12 point font provides ease of reading without strain.^{15,16}

Recency

Document recency was defined as EMT-PCs prepared or revised in the past 5 years. Other aspects of recency, such as current styles and current language, were not used in this study. Recency is important to consider as updated, cutting-edge information and images may be more compelling than those that are or appear to be outdated.¹⁰

Content

Quality of content was based upon 10 key messages concerning tobacco use. Eight were derived from Strategy B1 Motivational Interviewing Strategies of the U.S. Public Health Guidelines.⁷ From the Express Empathy Strategy, the topics included the benefits of quitting tobacco use, serious diseases related to tobacco use and the social aspects of tobacco use.⁷ From the Develop Discrepancy Strategy, the topics were health effects of quitting and nicotine replacement medications to aid in quitting.⁷ From the Roll with Resistance Strategy, the topics were withdrawal/addiction and tips to quit.⁷ From the Support Self-efficacy Strategy, the key message was substitute activities.⁷ The impact of smoking on oral health and the chemicals in tobacco were added as topics that oral health professionals would desire in their EMT-PCs.

Production quality

Production quality was based upon paper quality, presence of photographs or artwork and appropriate use of color.¹⁴ An EMT-PC with good production quality was defined as being made with glossy, heavy paper (above 20 pound paper), which could withstand repeated use, the use of color and the use of photographs. Average production quality was defined as the use of heavy (above 20 pound), but not glossy paper, the use of color and the use of art work, but not photographs. Poor quality was the use of 20 pound or less paper, no use of color or no use of art work or photographs.

Table I: EMT-PC Summary Data

Category	
Reading grade level	Number
Above Grade 8	9
Grade 8	3
Grades 3–8	19
Grades 2–3	9
Mean	6.67 (SD 3.72)
Font	
Serif	28
Sans serif	11
Mix of both	1
Point	
<12	8
12	21
>12	6
Multiple sizes	5
Mean	13.8 (SD 2.57)
Intended Audience	
Teen	13
Adult	13
Young adult	11
Older adult	1
Adult for teen	2
Recency:	
Before 2000	3
2000–2003	14
2004–2009	11
No date specified	12
Mean	5.9 (SD 3.4)

Data Analysis

For data analysis, the average, range and standard deviation for reading level, font size, recency, production quality and content were determined. Also, difficult terms were identified.

Results

The intended audiences for the 40 EMT-PCs included teens (13 EMT-PCs), adults (13 EMT-PCs), young adults (11 EMT-PCs), parents or adults for teens (2 EMT-PCs) and older adults (1 EMT-PC). There were no EMT-PCs in Spanish and no EMT-PCs for children under 11. The format of the documents included 24 tri-fold brochures, 3 quad-fold brochures, 6 cards, 5 booklets and 2 single fact sheets. The sources for the EMT-PCs were from private businesses (29 EMT-PCs), government agencies or research centers (9 EMT-PCs) and the American Dental Association (2 EMT-PCs).

Summary characteristics of the materials are presented in Table I. There were 9 documents above

the eighth grade, 3 at grade 8, 19 between grades 3 and 8 and 9 between grades 2 and 3. The mean grade level was grade 6.67 (standard deviation: 3.72).

The mean font size of the content of the documents was 13.8 (standard deviation: 2.57). The EMT-PCs for older adults were prepared with an appropriately large 14 point font, and the average font for the EMT-PCs prepared for teens was 12.3. Serif typeface was used in 70% of the texts and sans-serif was used in 27.5%, with 1 EMT-PC using both.

Of the 28 EMT-PCs which had a copyright, revision or another identifiable date, the average recency was 5.9 years (standard deviation: 3.4).

The topics involved in the content analysis can be found in Table II. The topics were rated as present if mentioned at all in the document. Of the 10 topics, the average number of topics presented in each document was 3.2 (standard deviation: 1.9). Sixty-seven words or phrases in the EMT-PCs were considered clinical/professional terms of possible reading and comprehension difficulty (Table III). There were no references made in any of the EMT-PCs as having been pre-tested.

Good production quality occurred in 22.5% of EMT-PCs (the 5 booklets and 4 of the tri-folds, documents that were created by the American Dental Association, the American Cancer Society, the West Virginia Tobacco Cessation Program, the National Institute of Craniofacial Research, Indiana University School of Dentistry and Oral Health America). Average production quality occurred in 72.5% of EMT-PCs (the remaining tri-folds, quad-folds and cards). Poor production quality was evident in 5% (the 2 pages of typed information on 20 pound paper). Ten EMT-PCs (25%) showed tobacco related lesions or surgical consequences (Table IV).

Discussion

The hypothesis for the readability of the EMT-PCs was supported in that the grade level of the material was an average of 6.67 and font size of 13.8, with 95% of the EMT-PCs having average to good production quality. The average recency was 5.9 years. The average content was 3 of the 10 evaluated el-

Table II: Key Messages In EMT-PCs

EMT-PC sample size	40
Key Messages	Number of EMT-PC addressing the topic
Benefits of quitting tobacco	16
Serious diseases may result from tobacco use	18
There are detrimental social aspects of tobacco use	17
There are health affects of tobacco use	19
Nicotine Replacement Therapy/other medications	7
Withdrawal/addiction	14
Tips on quitting tobacco use	10
Substitute activities to tobacco use	6
The chemicals present in tobacco	11
Oral consequences/oral cancer and tobacco use	16

ements, which follows the 2 to 3 topics per level of encounter (Express Empathy strategy, Develop Discrepancy Strategy, Roll with Resistance Strategy and Support Self-Efficacy Strategy) in the motivational interviewing strategies of the U.S Public Health Guidelines.⁷

Multiple brochures are given to patients or audience participants, which makes it possible to adequately cover all of the topics. It is important to know what a specific EMT-PC contains as well as its grade level. Tobacco prevention and cessation programs require considerable effort and presenting readable EMT-PCs with enough content to help a person quit or avoid tobacco use could be the difference a person needs for self-efficacy. When an EMT-PC is intended for an audience, general materials at or below the eighth grade level are appropriate. When the EMT-PC is for a specific individual, having a variety of materials of various reading levels from which to choose can customize the message.

People with a low health literacy level are more likely to have higher health care expenses, report poorer health and have more out-patient visits and hospitalizations due to a lack of understanding of their health problems and treatment.^{13,17,18} Although the average reading level in the United States is eighth to ninth grade, studies have shown that the literacy levels are 3 to 5 years below the highest grade completed.¹⁹ In selecting EMT-PCs, dental professionals should be aware of the impact and the frequency of low health literacy, especially in regions such as the Appalachians, in which there is a high rate of tobacco use and an average literacy rate. Dental hygienists and dentists select the EMT-PCs which ultimately determine if the needs of the target audience will be met.

None of the EMT-PCs selected for this study had reading levels noted within the document. It would

Table III: Professional Terms in EMT-PC

The following terms were in the 40 EMT-PC used in this study and may be unfamiliar to some readers:

abdominal aortic aneurism	epidermoid carcinoma	papillomatosis
acute necrotizing ulcerative gingivitis	feline carcinoma	periodontal
addiction	formaldehyde	phlegm
ammonia	gingivitis	physical dependence
anti-depressant	gulka	plaque
arsenic	halitosis	pneumonia
benign	larynx	polonium 210
betel quid	lesion	prostate cancer
bidi	leukemia	radioactive
bronchitis	macular degeneration	receding gums
calculus	malocclusion	recession
carbon monoxide	metastatic	regress
carcinoma	metabolism	rheumatoid arthritis
carcinogen	methane	sinusitis
cessation	miscarriage	sloughing
Chantix®	nicotine	still born
chronic inflammation	nicotine replacement therapy	stomatitis nicotina
coronary heart disease	nodular	sudden infant death syndrome
cyanide	olfactory	Varenicline
dentifrice	oral cancer	volatile
dopamine	osteoporosis	withdrawal
emphysema	papilla	Zyban

be helpful if organizations and professional associations would conduct the tests and print this information on their literature to assist oral health professionals. In the meantime, we suggest that when selecting EMT-PCs, dental hygienists and dentists use the Fry formula themselves to determine if the materials are appropriate for their target audience if no reading level is noted with the EMT-PC.

In the samples obtained for this study, the average EMT-PC was prepared below the recommended eighth grade reading level of the average United States adult reader, which was appropriate for the given target audience. None of the EMT-PCs were identified as being pre-tested for effectiveness in the delivery of the prevention/cessation message, none of the EMT-PCs directly targeted children and none of the EMT-PCs addressed people whose primary language was Spanish. When working with these groups, other EMT-PCs would be necessary beyond those from the study. The tobacco industry presents its message with high quality advertisements, utilizing advertising agencies, which specialize in creating a tempting, alluring image of glamour and mystique.⁸ Their advertising messages are tested in focus groups and are target-group specific.

The EMT-PCs need to be produced to a high level of quality to capture the attention of the target audiences, and they also need to be pre-tested for effectiveness. There is an on-going debate about using fear appeals in promoting health behaviors.

Table IV: Production Quality of the EMT-PC

Quality rating:	Number of Articles	Percentage
Good	9	22.5%
Average	29	72.5%
Poor	2	5%
Total	40	100%
Number of Photographs/ Drawings per EMT-PC	Number of EMT-PC (N=40)	
0-1	11	
2-5	17	
6-11	8	
≥12	4	
Mean 4.8, SD 4.72		

Some studies indicate that the documents should be non-threatening and non-fear provoking.⁸ Fear photos may not be effective in preventing tobacco use according to the American Heart Association.⁵ Therefore, such photographs possibly distracted from a prevention message. Other studies report that the perceptions of high threat and high efficacy appear to produce the most message acceptance.²⁰ More research is needed as to how the message itself should be presented. With the reading formula currently available, and the technology to create and quickly modify text and art work, it is possible

to develop and test health promotion and disease prevention materials that provide needed information in a manner that positively influences behavior. It is hoped that with such EMT-PCs, the smoking and chewing rates may continue to decline and the SAM will also fall.

Conclusion

The hypothesis that the EMT-PCs being distributed in the West Virginia University School of Dentistry programs met the criteria for appropriate grade level, font, quality and content was supported, while the average copyright or revision date was 5.9 years, slightly beyond the recommended 5 years. The readability and quality of EMT-PCs are measurable and should be considered when dental hygienists and dentists purchase tobacco EMT-PCs for their specific population base. The grade level of the EMT-PC is a critical concern since 14.5% of the United States population was illiterate in 2003.⁹ Studies suggest that production guidelines for effective, appropriate documents should be developed,

and organizations should collaborate to produce and pre-test and use the documents.¹⁰ Current documents need to be fine-tuned and the messages more fully developed and expanded so that neither content nor readability is sacrificed. It is our ethical duty to provide patients with appropriate information concerning tobacco use.

A free continuing education program, "Health Literacy for Public Health Professionals Online Training," is available at www.cdc.gov/Features/OnlineTraining to help health professionals better understand the needs of the public for appropriate health educational materials.²¹

R. Constance Wiener, DMD, is an assistant professor in the Department of Dental Practice and Rural Health, West Virginia University School of Dentistry, Morgantown, WV. Regina Wiener Pla, MA, is from the Foreign Service Institute-National Foreign Affairs Training Center, Office of the Director, Washington, DC.

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